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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,604	04/29/2005	Tomitaro Hara	112857-447	4564
29175 7590 02/26/2009 BELI., BOYD & LLOYD, LLP P. O. BOX 1135 CHICAGO, IL 60690				
EXAMINER NGUYEN, KHANH TUAN				
ART UNIT 1796		PAPER NUMBER		
MAIL DATE 02/26/2009		DELIVERY MODE PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/533,604

**Applicant(s)**

HARA ET AL.

**Examiner**

KHANH T. NGUYEN

**Art Unit**

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on RCE filed on 02/09/2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 18, 19 and 21-34 is/are pending in the application.
- 4a) Of the above claim(s) 22-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18, 19 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/08)  
Paper No(s)/Mail Date n/a.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/09/2009 has been entered.

### ***Claim Status***

2. The amendment filed on 02/09/2009 is entered and acknowledged by the Examiner. Claims 18-19 and 21-34 are pending in this application. Claims 1-17 and 20 were previously canceled without prejudice or disclaimer. Claims 22-34 were previously withdrawn from consideration.

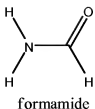
The rejection of claim 18 under 35 U.S.C. §112 is withdrawn in view of Applicant's amendment. The rejection of claims 18-19 and 21 rejected under 35 U.S.C. §103 is withdrawn in view of Applicant's amendment.

### ***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

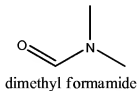
4. Claims 18, 19, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over either U.S. U.S. Pub. 2002/0160272 A1 (hereinafter Tanaka) or U.S. Pub. 2004/0115501 A1 (hereinafter Hinokuma) in view of U.S. Pat. 5,705,534 (hereinafter D'Agostino).

With respect to claims 18 and 21, Tanaka teaches a modified electrolyte membrane having proton conductivity [0002 and 0005]. The modified electrolyte membrane provides excellent heat resistance, strength and electric conductivity when it is applied to an electrochemical device under server conduction [0021 and 0023]. The said modified electrolyte membrane is considered a proton conductor. Tanaka teaches said modified electrolyte membrane comprises of a solid polymer such as perfluoro- polymer (e.g. Nafion) comprising of plural acid groups introduced to the side chain of said polymer ([0015] and [0034]). The acid groups includes  $\text{--SO}_3\text{H}$  [0050] as recited in claim 21. The acid groups of Tanaka are considered as protoic dissociation groups. The Nafion polymer of Tanaka is a commercially available perfluoro- film forming polymer. Tanaka further teaches the amount of protoic dissociation groups in the entire electrolyte can be controlled depending on the number of protoic dissociation groups introduced into the side chains, and the introduction of said groups does not change the structure of the main chain [0034]. The presence of said protoic dissociation groups on the side chain of the perfluoro-polymer is considered readable on  $n \geq 1$ . Thus, said polymer of Tanaka is readable on the first compound. Tanaka also teaches an amine compound that is a formamide compound when one hydrogen atom of ammonia is substituted with a formyl group [0053 and 0054].



The structure of Tanaka's amide compound, e.g. formamide compound, is readable on the second compound when R2 and R3 of the claimed compound are Hydrogen, respectively.

Hinokuma teaches a proton conductor containing carbon clusters with various acid functional groups such as  $-\text{SO}_3\text{H}$  and  $-\text{COOH}$  that are capable of releasing a protons (carbon cluster having a proton-dissociating ability) ([0010] and [0026]). The carbon cluster is a carbon polymer that is functionalized with a protoic dissociation group of  $-\text{SO}_3\text{H}$  and  $-\text{COOH}$ . The functionalized carbon cluster may form a film ([0024] and [0040]). The functionalized carbon cluster is readable on the first compound. Hinokuma also teaches the proton conductor containing a predetermined amount of a substance capable of serving as proton-receiving and proton dissociation promoter [0034]. The proton-receiving substance may include dimethyl formamide [0036].



Although Tanaka and Hinokuma did not expressly suggest the amide compound impregnating the polymer film. Tanaka teaches a step of contacting the polymer film with an amine compound to form the modified electrolyte membrane [0044 and 0045]

wherein the contacting method includes immersing the polymer film in a solution containing amide compound and a solvent ([0059] and Examples). The process of contacting an amide compound with the polymer film would obviously impregnate the amide compound into the polymer film as evident by D'Agostino. D'Agostino suggests that a Nafion membrane can be impregnated with a solution of metal complex and dimethyl formamide by immersing (contacting) said Nafion membrane in the dimethyl formamide solution (Examples 3 and 4). In other words, the dimethyl formamide can impregnate into the Nafion membrane by contacting, i.e. immersing, the two components together.

Moreover, claim18 is product-by-process claim and is not limited to the manipulation of the recited step, only the structure limited by the step. The patentability of the proton conductor does not depend on its method of production and the claimed steps, i.e. impregnating the first compound film with the second compound.

The claims differ from Tanaka by reciting the number of moles of the protoic dissociation group ( $a \times n$ ) is greater than or equal to 10 and less than or equal to 30.

However, it would have been obvious to the skilled artisan to produce the claimed proton conductor as suggest by Tanaka having proton conductor with the number of moles of a protoic dissociation group greater than or equal to 10 and less than or equal to 30 because Tanaka teaches the amount, i.e. number of moles, of protoic dissociation groups in the entire electrolyte can be controlled depending on the number of protoic dissociation groups introduced into the side chains [0034]. Further, the subject matter as a whole would have been obvious to one having ordinary skill in

the art at the time the invention was made to arrive at the portion of 10 to 30 moles of protoic dissociation groups in the entire electrolyte because it is within the expected skills of a skilled artisan to be able to arrive at the optimum proportions through routine experimentation for best results. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the *prima facie* case of obviousness. See *In re Boesch*, 617 F.2d 272,276,205 USPQ 215,219 (CCPA 1980). See also *In re Woodruff* 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990).

Regarding claim 19, it has been held by the court that structurally similar compounds, i.e. formamide compound, are generally expected to have similar properties. In *re Gvurik*, 596 F. 2d 1012,201 USPQ 552. Closely related homologues, analogs and isomers in chemistry may create a *prima facie* case of obviousness. In *re Dillon* USPQ 2d 1 897,1904 (Fed. Cir. 1990); In *re Payne* 203 USPQ 245 (CCPA 1979); *In re Mills* 126 USPQ 5 13 (CCPA 1960); In *re Henze* 85 USPQ 261 (CCPA 1950); *In re Hass* 60 USPQ 544 (CCPA 1944). Thus, it would have been obvious to the skilled artisan to at the time the invention was made to modify the proton conductor of Tanaka by substituting the formamide of Tanaka with another amine compound such as N, N-dimethyl formamide and N-methyl formamide to yield a predictable result.

In view of the foregoing, the above claims have failed to patentably distinguish over the applied art.

***Response to Arguments***

5. Applicant's arguments filed on 02/09/2009 have been fully considered but they are not persuasive.

In response to the Applicant's remark on page 13, Applicant argues that one of ordinary skill in the art would not have arrived at the presently claimed range from Tanaka based on mere routine experimentation because Tanaka fails to recognize any relationship between the number of moles of the second compound and the number of moles of the protoic dissociation group. Instead, Tanaka merely discloses that the electrical conductivity is generally higher when the number of side chains and/or terminal acid groups is increased. See, Tanaka, page 7, paragraph 102, lines 4-8. Tanaka teaches controlling the conductivity based only on the number and kind of acid or protoic dissociation groups, not based on the molar ratio of those groups to that of the amine compound. As such, one of ordinary skill in the art reading Tanaka would have no reason to experiment with or modify the molar ratio of the amine compound to that of the protoic dissociation group. The Examiner respectfully disagrees with the Applicant argument.

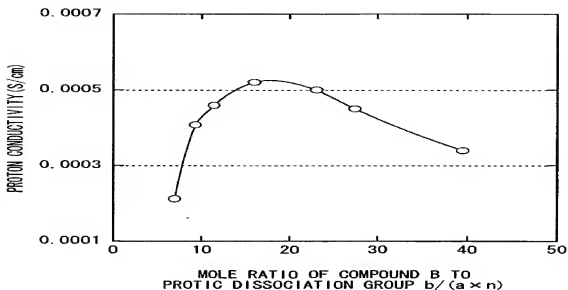
Applicant should refer to Tanaka at paragraph 0034 wherein Tanaka suggest the controlling the electrical conductivity of the solid electrolyte polymer by introducing into acid groups (protoic dissociation groups) into the side chain of the electrolyte polymer. In other words, Tanaka suggests modifying the ratio of acid group to solid electrolyte polymer to provide a desirable electrical conductivity. Thus, one of ordinary skill in the art having the desire to modify the electrical conductivity of the proton conductor of



Tanaka would modify the amount of acid groups (protoic dissociation groups) with respect to the amount of electrolyte polymer which would indirectly effect the ratio of acid groups (protoic dissociation groups) with respect to the amide compound. Further, the modification of the amount of acid groups (protoic dissociation groups) with respect to the amount of electrolyte polymer encompass molar ratio since the amount ratio can easily be converted into molar ratio.

Applicant further argues that the claimed mole ratios achieve **unexpected results** over other ranges as demonstrated in the Specification. The Examiner respectfully disagrees with the Applicant argument.

Considered Fig. 1 of the Specification (as shown below), the difference in proton conductivity (s/cm) between a composition with a mole ratio of 10 as compared to a composition with a mole ratio of 40 is less than about 0.0001 S/cm, such a difference proton conductivity is marginal and does not constitute unexpected result. In addition, the composition containing of about 31 mole ratio of compound B to protoic dissociation group b/(a×n) has about the same or substantially similar proton conductivity as the composition with a mole ratio of 10.



### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHANH T. NGUYEN whose telephone number is (571) 272-8082. The examiner can normally be reached on Monday-Friday 7:00-4:00 EST PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KTN/  
02/17/2009

/DOUGLAS MC GINTY/  
Primary Examiner, Art Unit 1796